Shang-Chi Tsai

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RESEARCH TOPICS

Natural language processing and large language modeling; other interests are dialogue system, multi-modal model, clinical decision system, healthcare application and NLP with clinical data (EHRs).

EDUCATION

National Taiwan University (NTU) 2019/09 –2025/07
Doctor of Philosophy (Ph.D.) in Computer Science
Advisor: Yun-Nung (Vivian) Chen
Thesis : Advancing Healthcare Application Usability and Medical Document Understanding via Language Modeling Techniques

National Taiwan University (NTU) 2017/09 – 2019/06
Master Degree of Data Science
Advisor: Yun-Nung (Vivian) Chen
Co-Advisor: Lun-Wei Ku
Thesis : Leveraging Hierarchical Category Knowledge for Multi-Label Diagnostic Text Understanding

National Taiwan University (NTU) 2012/09 – 2017/01
Bachelor Degree of Computer Science and Information Engineering

RESEARCH EXPERIENCES

NTU CSIE Machine Intelligence and Understanding Lab (MiuLab) 2017/09 – 2025/07
Graduate Research Assistant
Advisor: Yun-Nung (Vivian) Chen

- **Automatic ICD Coding** : Automatic ICD coding is a challenging task in the field of medical NLP. It takes clinical notes as input and aims to predict diagnostic and procedural codes, typically formulated as a multi-label classification problem. Since these label codes follow a human-defined hierarchical and categorical structure, we designed a series of loss functions to leverage this known hierarchical knowledge to improve prediction performance. On the other hand, we also designed two models that can directly learn the relationships and correlations between codes from the labels distribution in the training data. These models serve as re-rankers to further refine and improve the prediction results.
  - Published in LOUHI@EMNLP 2019 [5] and NAACL-HLT 2021 [4]
- **Clinical Language Modeling** : We are the first to successfully apply pretrained language models to the task of automatic ICD coding. Our approach overcomes several key challenges, including limitations in input text length, domain mismatch between pretraining data and clinical notes, and the reduced predictive capacity caused by the large number of label codes. We achieved state-of-the-art results and received a significant number of citations for our work.
  - Published in Clinical NLP@NAACL 2022 [3]
- **Healthcare Dialogue System** : To enhance the patient experience during medical consultations, we developed a medical large language model that can simultaneously convey medical knowledge and provide emotional support to alleviate patients' negative emotions. We utilized a large language model to rewrite an existing medical consultation dataset, generating dialogues that incorporate patients' negative emotions and empathetic responses from doctors—while preserving the original medical knowledge. Subsequently, we applied various alignment training strategies to successfully enable the large language model to learn the characteristics of the constructed dataset.
  - Published in IWSDS 2025 [1] (**Oral Paper**)

RIKEN, Knowledge Acquisition and Dialogue Research Team, Japan 2024/07 – 2024/09
Research Intern 2023/08 – 2023/10
Advisor: Koichiro Yoshino

- **Multi-modal robotic dialogue model** : To enable robots to assist users with everyday needs in home environments, we developed a multi-modal large language model that can interpret the surrounding environment and understand users' ambiguous requests, allowing it to predict and respond with reflected actions. We combined a large language model and a diffusion model to develop two data augmentation methods for generating two kinds of training data. One type of data is for learning generalized scenes and actions, while the other focuses on learning specific scenes and actions.
  - Published in IWSDS 2024 [2] (**Best Paper Award**)

WORKING EXPERIENCES

National Taiwan University 2019/02 –2025/06
Teaching Assistant
[CSIE5431] Applied Deep Learning (2019 Spring & 2020 Spring & 2022 Fall)
[CSIE7430] Advanced Deep Learning (2025 Spring)

Appier Inc. , Taiwan 2022/03 – 2022/09
Machine Learning Engineering Intern, ChatBot Group

- Building a chatbot template recommendation system based on industry goals and history dialogues.

ASUS Inc., Taiwan 2019/09 – 2021/06
AI Engineering Intern, NLP Group

- Building a NLP model for clinical documents understanding and diagnosis codes classification.

Fubon Bank , Taiwan 2019/03 – 2019/05
Software Engineering Intern, NLP Group

- Building a NLP model to predict the insurance claims based on the content in the insurance policies.

Academia Sinica, Taiwan 2016/07 – 2017/01
Student Intern, Bioinformatics Lab

- Building a public database with visualization tools to explore mRNA difference between drosophilas

PUBLICATIONS

[1] Shang-Chi Tsai, Yun-Nung Chen, "Balancing Knowledge Delivery and Emotional Comfort in Healthcare Conversational Systems" Proceedings of International Workshop on Spoken Dialogue Systems Technology. **(IWSDS 2025 Oral paper)**

[2] Shang-Chi Tsai, Seiya Kawano, Angel Garcia Contreras, Koichiro Yoshino, Yun-Nung Chen, "ASMR: Augmenting Life Scenario using Large Generative Models for Robotic Action Reflection" Proceedings of International Workshop on Spoken Dialogue Systems Technology. **(IWSDS 2024** Best paper**)**

[3] Chao-Wei Huang, Shang-Chi Tsai, Yun-Nung Chen, "PLM-ICD: Automatic ICD Coding with Pretrained Language Models" Proceedings of the 4th Clinical Natural Language Processing Workshop **(ClinicalNLP@NAACL 2022)**

[4] Shang-Chi Tsai, Chao-Wei Huang, Yun-Nung Chen, " Modeling Diagnostic Label Correlation for Automatic ICD Coding" Proceedings of the 2021 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies **(co-first author) (NAACL-HLT 2021)**

[5] Shang-Chi Tsai, Ting-Yun Chang, Yun-Nung Chen, " Leveraging Hierarchical Category Knowledge for Data-Imbalanced Multi-Label Diagnostic Text Understanding" Proceedings of the Tenth International Workshop on Health Text Mining and Information Analysis **(LOUHI@EMNLP 2019)**

[6] Shang-Chi Tsai, Ting-Yun Chang, Ta-Chung Chi, Yun-Nung Chen, " xSense: Learning Sense-Separated Sparse Representations and Textual Definitions for Explainable Word Sense Networks" arXiv preprint arXiv:1809.03348 **(co-first author)**

[7] I-Man Ng, Jia-Hsin Huang, Shang-Chi Tsai, Huai-Kuang Tsai, " IsoPlot: a database for comparison of mRNA isoforms in fruit fly and mosquitoes" Database, Oxford University Press, 2017

PROFESSIONAL SKILLS

Languages: Mandarin Chinese, English
Programming: Python, PyTorch, Transformers
Techniques: Natural Language Processing, Deep Learning, Large Language Modeling, Dialogue System, Medical Document Understanding and Classification

LINKS

Google Scholar : https://scholar.google.co.jp/citations?hl=zh-TW&user=XKQnvIgAAAAJ
Github : https://github.com/mikekd106
Linkedin : https://www.linkedin.com/in/shang-chi-tsai-152a962b4/
Website : https://mikekd106.github.io/shangchitsai.github.io/

REFERRERS

- **Prof. Yun-Nung (Vivian) Chen**
  Professor, Computer Science, National Taiwan University (NTU), yvchen@csie.ntu.edu.tw
- **Dr. Chao-Wei Huang**
  Research Scientist , Meta, f07922069@csie.ntu.edu.tw
- **Prof. Koichiro Yoshino**
  Associate Professor, Computer Science, Tokyo Institute of Technology, koichiro@c.titech.ac.jp